

**(2.7) Using Coordinates to Solve Problems**

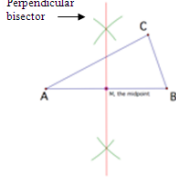
Recall:

Median \_\_\_\_\_

Altitude \_\_\_\_\_

Perpendicular bisector: \_\_\_\_\_

in two equal parts  
and intersects



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**(2.7) Using Coordinates to Solve Problems**

Recall:

Median \_\_\_\_\_

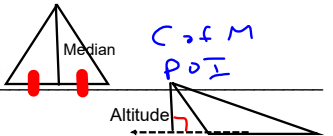
Altitude \_\_\_\_\_

Perpendicular bisector: \_\_\_\_\_

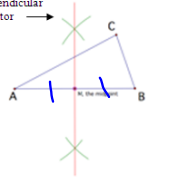
in two equal parts  
and intersects

C of M  
POI

Area



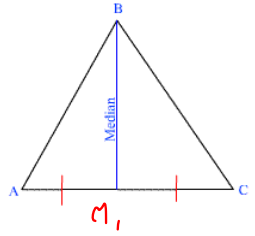
Circumcentre  
POI



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To find the equation of a **median**:

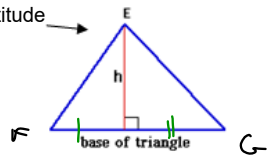
- Find the midpoint of the opposite side
- Use the vertex and midpoint to determine the slope
- Use either point to determine the y-intercept
- Put information together into  $y = mx + b$



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To find the equation of an **altitude**:

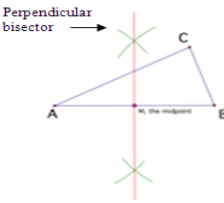
- Find the slope of the opposite side using the vertices
- Take the negative reciprocal of the slope
- Use the vertex containing the altitude to determine the y-intercept
- Put information together into  $y = mx + b$



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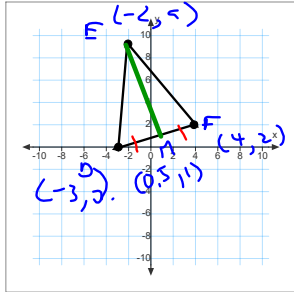
To find the equation of a **perpendicular bisector**:

- Find the slope of the opposite side
- Take the negative reciprocal of the slope
- Find the midpoint of the opposite side
- Use the midpoint to determine the y-intercept
- Put information together into  $y = mx + b$



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**Example 1:**  
Graph the triangle defined by D(-3,0), E(-2,9) and F(4,2).

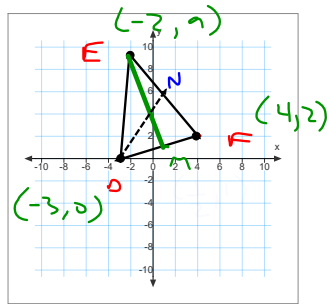


Calculate the length of the median from vertex E  
Calculate the equation of the median from vertex E

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**Example 1:**

Graph the triangle defined by D(-3,0), E(-2,9) and F(4,2).



Calculate the length of the median from vertex E  
 Calculate the equation of the median from vertex E

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$$D(-3,0) \quad F(4,2)$$

$$x_1 \ y_1 \quad x_2 \ y_2$$

Midpoint

$$M\left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}\right)$$

$$\left(\frac{-3+4}{2}, \frac{0+2}{2}\right)$$

$$+\frac{1}{2}, \frac{2}{2}$$

$$\left(\frac{1}{2}, 1\right) \text{ Midpoint } N$$

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Distance  $M\left(\frac{1}{2}, 1\right)$   $E(-2, 9)$

$$D = \sqrt{(y_2 - y_1)^2 + (x_2 - x_1)^2}$$

$$= \sqrt{(9-1)^2 + (-2 - 0.5)^2}$$

$$= \sqrt{(8)^2 + (-2.5)^2}$$

$$= \sqrt{64 + 6.25}$$

$$= \sqrt{70.25}$$

$$= 8.4$$

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**Eqn of the Median Line**

$$y = mx + b$$

$$M(0.5, 1) \quad E(-2, 9)$$

$$x_1 \ y_1 \quad x_2 \ y_2$$

$$m = \frac{9-1}{-2-0.5}$$

$$= \frac{8}{-2.5}$$

$$= -3.2$$

$$y = -3.2x + b$$

$$9 = -3.2(-2) + b$$

$$9 = 6.4 + b$$

$$9 - 6.4 = b$$

$$2.6 = b$$

$$y = -3.2x + 2.6$$

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**Homework**

p.120-121

q. 6,7 &amp; 10

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Find the Eqn of DN

$$D(-3,0), \quad N(?)$$

Midpoint N

$$E(-2,9) \quad F(4,2)$$

$$x_1 \ y_1 \quad x_2 \ y_2$$

$$\frac{-2+4}{2}, \frac{9+2}{2}$$

$$\frac{2}{2}, \frac{11}{2}$$

$$N(1, 5.5)$$

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$D(-3, 0)$   $N(1, 3.5)$   
 $x_1, y_1$   $x_2, y_2$

$m = \frac{y_2 - y_1}{x_2 - x_1}$   
 $m = \frac{3.5 - 0}{1 - (-3)}$   
 $m = \frac{3.5}{4}$   
 $m = \frac{7}{8}$

$y = mx + b$   
 $y = \frac{7}{8}x + b$

$D(-3, 0)$   
 $0 = \frac{7}{8}(-3) + b$   
 $0 = -\frac{21}{8} + b$   
 $\frac{21}{8} = b$

$y = \frac{7}{8}x + \frac{21}{8}$

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